

WHAT IS CLAIMED IS:

1. A method of determining a measure of image complexity, the method comprising:
subdividing an image into a plurality of small image regions;
performing multiple statistical tests to determine the similarity of at least
5 one pair of adjacent image regions; and
grouping the at least one pair of adjacent image regions together into one
new region if said pair passes the multiple statistical tests.
2. The method of claim 1, further comprising:
10 iterating said steps of performing the multiple statistical tests for pairs of
adjacent image regions and grouping the pairs of image regions that pass the
multiple statistical tests until no remaining pairs of adjacent image regions in the
image pass the multiple statistical tests.
- 15 3. The method of claim 2, further comprising:
making a weighted count of the resulting image regions, where weights
depend on a geometrical characteristic of the image regions.
4. The method of claim 1, wherein the multiple statistical tests include a test of
20 whether the adjacent image regions have sufficiently similar variances in their data.
5. The method of claim 4, wherein the adjacent image regions are determined to
have sufficiently similar variances if a statistical f-test is passed.
- 25 6. The method of claim 5, wherein the statistical f-test is passed if a ratio
of $\max(\sigma_1^2, \sigma_2^2)$ divided by $\min(\sigma_1^2, \sigma_2^2)$ is less than a threshold value, and wherein σ_1^2
and σ_2^2 comprise the variances of the adjacent image regions.
7. The method of claim 4, wherein the multiple statistical tests further include a test
30 of whether data for the adjacent image regions have sufficiently similar means in their
data.

8. The method of claim 7, wherein the adjacent image regions are determined to have sufficiently similar means if a statistical t-test is passed.
- 5 9. The method of claim 1, wherein the multiple statistical tests include both a statistical f-test and a statistical t-test.
10. The method of claim 1, wherein the method is used to guide segmentation of an image into arbitrarily-shaped regions.
- 10 11. A device for processing an image frame, the device comprising:
a complexity measuring apparatus configured to subdivide the image frame into a plurality of small image regions, perform multiple statistical tests to determine the similarity of at least one pair of adjacent image regions; and group the at least one pair of
15 adjacent image regions together into one new region if said pair passes the multiple statistical tests.
12. The device of claim 11, further comprising:
an image segmenter configured to receive a measure of complexity of the image
20 frame from the complexity measuring apparatus.
13. A system for encoding and decoding image frames of a video sequence, the system comprising:
an encoder for encoding the image frame of the video sequence including at least
25 a complexity measuring apparatus and an image segmenter; and
a decoder for receiving an encoded bit stream from the encoder and configured to reconstruct the video sequence therefrom,
wherein the complexity measuring apparatus is configured to subdivide the image frame into a plurality of small image regions, perform multiple statistical tests to
30 determine the similarity of at least one pair of adjacent image regions; and group the at

least one pair of adjacent image regions together into one new region if said pair passes the multiple statistical tests